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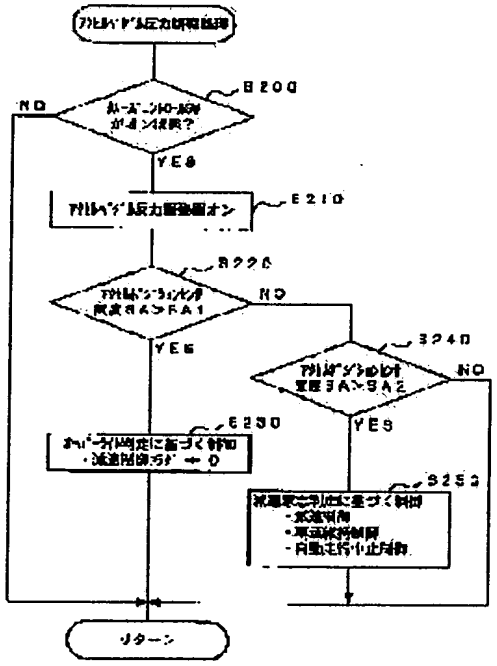
(54) AUTOMATIC TRAVELING CONTROL DEVICE, PEDAL REACTION REGULATOR AND RECORDING MEDIUM

(57)Abstract:
PROBLEM TO BE SOLVED: To rapidly perform pedal operation and also reduce the burden to the pedal operation even though automatic traveling control is executed.
SOLUTION: It is judged whether or not a cruise control switch is switched on (S200). An accelerator pedal reaction regulator is switched on (S210). Based on the signal of an accelerator position sensor, it is judged whether or not an accelerator opening SA exceeds a first reference value SA1 having a large value (S220). When an accelerator pedal is changed from a condition that a foot is placed simply on the accelerator pedal to a condition that the foot is further stepped, an acceleration-intention is discriminated to, control based on override judgment (S230). It is judged whether or not the accelerator opening SA is less than a second reference value SA2 having a small value (S240). When judging a condition that the foot is separated from the accelerator pedal, control based on judgment of speed-down-intention is performed (S250).



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CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] The automatic run control unit carry out having had the accelerator pedal reaction force adjustment means to which the reaction force of an accelerator pedal is made to increase when the automatic run was performed with the automatic run setting means which enables the aforementioned automatic run in the automatic run control unit which performs automatic run control it can run, and the aforementioned automatic [without operation by the crew of vehicles / it is automatic and] run setting means as the feature.
[Claim 2] The aforementioned accelerator pedal reaction force adjustment means is an automatic run control unit given in the aforementioned claim 1 characterized by being set up so that reaction force can be given to this accelerator pedal in the predetermined treading-in maintenance position of the aforementioned accelerator pedal in the case of the aforementioned automatic run.
[Claim 3] The aforementioned accelerator pedal reaction force adjustment means is an automatic run control unit given in the aforementioned claim 2 characterized by for the aforementioned accelerator pedal stepping on, increasing and setting up reaction force possible in the case of the aforementioned automatic run so that it can accelerate by crew's volition from the treading-in maintenance position of the aforementioned accelerator pedal.
[Claim 4] The treading-in maintenance position of the aforementioned accelerator pedal is the aforementioned claim 2 characterized by being set up in the range which the reaction force for supporting a load when the aforementioned crew's leg is placed is obtained, and a throttle does not open, or an automatic run control unit given in 3.
[Claim 5] An automatic run control unit given in either of the aforementioned claims 1-4 characterized by having a treading-in state detection means to detect the treading-in state of the aforementioned accelerator pedal, and a control mode change means to change the control mode of the aforementioned automatic run control according to the treading-in state detected by the aforementioned treading-in state detection means.
[Claim 6] The aforementioned control mode change means is an automatic run control unit given in the aforementioned claim 5 characterized by changing into the control mode which decreases the aforementioned vehicle speed when the value which shows treading in to the aforementioned accelerator pedal detected by the aforementioned treading-in state detection means becomes near the zero.
[Claim 7] The aforementioned control mode change means is an automatic run control unit given in the aforementioned claim 5 characterized by changing into the control mode which maintains the aforementioned vehicle speed when the value which shows treading in to the aforementioned accelerator pedal detected by the aforementioned treading-in state detection means becomes near the zero.
[Claim 8] The aforementioned control mode change means is an automatic run control unit given in the aforementioned claim 5 characterized by changing into the control mode which stops the aforementioned automatic run when the value which shows treading in to the aforementioned accelerator pedal detected by the aforementioned treading-in state detection means becomes near the zero.

[Claim 9] An automatic run control unit given in either of the aforementioned claims 1-8 characterized by having a selection means by which crew can choose whether the aforementioned accelerator pedal reaction force adjustment means is operated.
[Claim 10] The automatic run control unit carry out having had the brake-pedal reaction-force adjustment means to which the reaction force of a brake pedal is made to increase when the automatic run was performed with the automatic run setting means which enables the aforementioned automatic run in the automatic run control unit which performs automatic run control it can run, and the aforementioned automatic [without operation by the crew of vehicles / it is automatic and] run setting means as the feature.
[Claim 11] The aforementioned brake-pedal reaction force adjustment means is an automatic run control unit given in the aforementioned claim 10 characterized by being set up so that reaction force can be given to this brake pedal in the predetermined treading-in maintenance position of the aforementioned brake pedal in the case of the aforementioned automatic run.
[Claim 12] The aforementioned brake-pedal reaction force adjustment means is the aforementioned claim 10 characterized by for the aforementioned brake pedal stepping on, increasing and setting up reaction force possible in the case of the aforementioned automatic run so that it can slow down by crew's will from the treading-in maintenance position of the aforementioned brake pedal, or an automatic run control unit given in 11.
[Claim 13] The treading-in maintenance position of the aforementioned brake pedal is the aforementioned claim 11 characterized by being set up in the range in which the reaction force for supporting a load when the aforementioned crew's leg is placed is obtained, and a master cylinder pressure carries out a specified quantity boost, and which vehicles do not slow down, or an automatic run control unit given in 12.
[Claim 14] The treading-in maintenance position of the aforementioned brake pedal is the aforementioned claim 11 characterized by being set up in the range which the reaction force for supporting a load when the aforementioned crew's leg is placed is obtained, and a brake lamp does not turn on, or an automatic run control unit given in 12.
[Claim 15] An automatic run control unit given in either of the aforementioned claims 10-14 characterized by having a treading-in state detection means to detect the treading-in state of the aforementioned brake pedal, and a control mode change means to change the control mode of the aforementioned automatic run control according to the treading-in state detected by the aforementioned treading-in state detection means.
[Claim 16] The aforementioned control mode change means is an automatic run control unit given in the aforementioned claim 15 characterized by changing into the control mode which forbids reduction of the aforementioned vehicle speed when the value which shows treading in to the aforementioned brake pedal detected by the aforementioned treading-in state detection means becomes near the zero.
[Claim 17] The aforementioned control mode change means is an automatic run control unit given in the aforementioned claim 15 characterized by changing into the control mode which maintains the aforementioned vehicle speed when the value which shows treading in to the aforementioned brake pedal detected by the aforementioned treading-in state detection means becomes near the zero.
[Claim 18] The aforementioned control mode change means is an automatic run control unit given in the aforementioned claim 15 characterized by changing into the control mode which stops the aforementioned automatic run when the value which shows treading in to the aforementioned brake pedal detected by the aforementioned treading-in state detection means becomes near the zero.
[Claim 19] An automatic run control unit given in either of the aforementioned claims 10-18 characterized by having a selection means by which crew can choose whether the aforementioned brake-pedal reaction force adjustment means is operated.
[Claim 20] The aforementioned vehicles run control unit is an automatic run control unit given in either of the aforementioned claims 1-19 characterized by adjusting an acceleration means and/or a slowdown means in order to control this physical relationship to desired value based on the physical relationship of self-vehicles and precedence vehicles.

[Claim 21] The aforementioned vehicles traveller is an automatic run control unit given in either of the aforementioned claims 1-19 characterized by adjusting an acceleration means and/or a slowdown means in order to control the speed of self-vehicles to the set-up desired value.
[Claim 22] An automatic run control unit given in either of the aforementioned claims 1-21 characterized by the vehicles which perform the aforementioned automatic run control being vehicles which have the mechanism in which operation of an accelerator pedal is mechanically transmitted to a throttle.
[Claim 23] An automatic run control unit given in either of the aforementioned claims 1-22 characterized by being the vehicles with which the vehicles which perform the aforementioned automatic run control were equipped with the electronic throttle which drives a throttle with the electric signal corresponding to operation of an accelerator pedal.
[Claim 24] The automatic run control unit carry out having had a change means change the operating state of the electronic throttle corresponding to the stroke of an accelerator pedal according to the case of execution of the automatic run by the automatic run setting means which enables an automatic run, and the aforementioned automatic run setting means, and a stop in the automatic run control unit which performs automatic run control to the vehicles equipped with the electronic throttle which drives a throttle with the electric signal corresponding to operation of an accelerator pedal as the feature.
[Claim 25] An automatic run control unit given in the aforementioned claim 24 characterized by controlling the operating state of the aforementioned electronic throttle in the suppression direction of open operation compared with the case of a stop of the aforementioned automatic run in execution of the aforementioned automatic run.
[Claim 26] The pedal reaction force regulator which the aforementioned claims 1-23 are the pedal reaction force regulators used for the automatic run control unit of a publication either, and is characterized by having the mechanism which projects from the treading-in direction and opposite direction of a pedal to a pedal side, and gives reaction force to a pedal in contact with the time of treading in to a pedal in the case of the aforementioned automatic run.
[Claim 27] The aforementioned claims 1-25 are the record media characterized by recording the means for realizing the function of the automatic run control unit of a publication either.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the record medium which recorded the program which realizes an automatic run control unit applicable to for example, distance-between-two-cars control, fixed-speed run control, etc., the pedal reaction force regulator which can be used for this automatic run control unit, and this automatic run control unit in a computer system.
[0002]
[Description of the Prior Art] In order to maintain the suitable distance between two cars between precedence vehicles based on the physical relationship of for example, a self-vehicle and the precedence vehicle which runs the front as an automatic run control unit which performs an automatic run of vehicles conventionally, without being based on operation of an operator, the equipment which performs distance-between-two-cars control (cruise control between vehicles) which adjusts the output of an engine etc. is known.
[0003] Moreover, the equipment which performs fixed-speed run control (fixed-speed cruise control) which makes it run vehicles by fixed speed apart from this based on the vehicle speed set up by the operator is known.
[0004]
[Problem(s) to be Solved by the Invention] However, a technical problem as shown below occurs in the Prior art mentioned above. since the leg is put on the accelerator pedal at the time of a run, a brake pedal is made to usually move a leg from an accelerator pedal at the time of braking in the case of the conventional vehicles which do not carry an automatic run control unit -- sufficient -- it is easy to grasp a pedal position That is, at the time of braking, pedal operation is [that what is necessary is just to move a leg to the next pedal] easy.
[0005] On the other hand, in the conventional automatic run control unit, it is automatic, and while following on the precedence vehicle, the accelerator pedal operation for acceleration and deceleration and brake pedal application become unnecessary, and there is an advantage that the right leg which was operating these can be put on a floor. However, when an operator's brakes operation is needed with the sudden slowdown of a precedence vehicle, you have to move a leg to a brake pedal from a floor.
[0006] That is, at the time of braking, although there is an advantage that a right leg can be set to the floor, since it is necessary to move a right leg to a brake pedal from a floor, in order to distinguish the accelerator pedal and brake pedal which exist in the same front position and to step on rightly, careful cautions are needed in the conventional automatic run control unit.
[0007] Moreover, since the time which movement of a right leg takes for operation to each pedal from the floor of this right leg becomes long a little, when it is a cruise between vehicles, it will be necessary to also set up flattery distance for a long time, and the selection range of the operator about flattery distance will be limited. Furthermore, although it may be in the standby state stopped just before separating a right leg from a floor beforehand and stepping on a brake pedal in consideration of the transit time of the right leg mentioned above on the ambiguous aspect of affairs of the need for the brake pedal application by the operator, when such, there is

a problem that defatigation of a right leg will increase.
[0008] The place which it is made in order that this invention may solve the aforementioned technical problem, and is made into the purpose is offering the automatic run control unit, pedal reaction force regulator, and record medium which can mitigate the burden of pedal operation while being able to perform pedal operation promptly, even when performing automatic run control.
[0009]
[A The means for solving a technical problem and an effect of the invention] (1) In the automatic run control unit with which invention of a claim 1 is automatic with a control unit and performs without operation by the crew of vehicles automatic run control it can run The automatic run setting means which enables the aforementioned automatic run (for example, various kinds of meanses to adjust driving force and damping force), When the automatic run is performed with the aforementioned automatic run setting means, let the automatic run control unit characterized by having the accelerator pedal reaction force adjustment means (for example, accelerator pedal reaction force regulator) to which the reaction force of an accelerator pedal is made to increase be a summary.
[0010] When the automatic run is performed with the automatic run setting means, the reaction force of an accelerator pedal is made to increase by the accelerator pedal reaction force adjustment means in this invention. Thereby, during an automatic run, when it considers only as the state (state of excusing him from a leg) where the leg was carried at the accelerator pedal, an accelerator pedal can be held with reaction force, and it can maintain so that it may not be in an acceleration state. Therefore, pedal operation can be ensured [promptly and], when braking operation and acceleration operation are needed by a certain cause during an automatic run, since the leg was put on the accelerator pedal.
[0011] Acceleration operation can be started if a leg is moved to the next brake pedal and it only specifically breaks in, braking operation can be started, and the leg on an accelerator pedal is broken in as it is on the other hand when it is acceleration. Moreover, at the time of the usual operation without an automatic run, except the aspect of affairs which needs brakes operation, an operator puts a leg on an accelerator pedal and does the acceleration and deceleration of the vehicles by positioning of this accelerator pedal. Therefore, like this invention, except the aspect of affairs which needs brakes operation like the time of the aforementioned usual operation by preparing a reaction force adjustment means in an accelerator pedal, a leg can be put on an accelerator pedal and an automatic run can be performed without sense of incongruity.
[0012] (2) Invention of a claim 2 makes the automatic run control unit of a publication a summary at the aforementioned claim 1 characterized by setting up the aforementioned accelerator pedal reaction force adjustment means so that reaction force can be given to this accelerator pedal in the predetermined treading-in maintenance position of the aforementioned accelerator pedal in the case of the aforementioned automatic run.
[0013] this invention has illustrated operation of the accelerator pedal reaction force adjustment means in the case of an automatic run. Here, the accelerator pedal stopper of for example, an accelerator pedal reaction force regulator projects in an accelerator pedal side in the case of an automatic run. Therefore, when a leg is only laid in an accelerator pedal and an accelerator pedal moves to a predetermined treading-in maintenance position, an accelerator pedal will be in the state where it does not get into an accelerator pedal any more for example, from an accelerator pedal stopper in response to reaction force.
[0014] (3) Invention of a claim 3 makes the automatic run control unit of a publication a summary at the aforementioned claim 2 characterized by for the aforementioned accelerator pedal stepping on, increasing and setting up reaction force possible so that the aforementioned accelerator pedal reaction force adjustment means can be accelerated by crew's volition from the treading-in maintenance position of the aforementioned accelerator pedal in the case of the aforementioned automatic run.
[0015] this invention has illustrated operation of the accelerator pedal reaction force adjustment means in the case of an automatic run. Here, in the case of an automatic run, reaction force is set up so that it may be possible to get into an accelerator pedal further from the state where

the leg was only laid. Therefore, acceleration operation can be started if an accelerator pedal is broken in and died as it is to accelerate.
[0016] (4) Invention of a claim 4 makes a summary the aforementioned claim 2 characterized by setting up the treading-in maintenance position of the aforementioned accelerator pedal in the range which the reaction force for supporting a load when the aforementioned crew's leg is placed is obtained, and a throttle does not open, or an automatic run control unit given in 3.
[0017] this invention illustrates the treading-in maintenance position of an accelerator pedal. In this invention, since the treading-in maintenance position of an accelerator pedal is set up in the range which the reaction force for supporting a load when crew's leg is placed is obtained, and a throttle does not open, acceleration operation is not started only by laying a leg in an accelerator pedal.
[0018] (5) Invention of a claim 5 makes the automatic run control unit of a publication a summary at either of the aforementioned claims 1-4 characterized by having a treading-in state detection means to detect the treading-in state of the aforementioned accelerator pedal, and a control mode change means to change the control mode of the aforementioned automatic run control according to the treading-in state detected by the aforementioned treading-in state detection means.
[0019] In this invention, the control mode of automatic run control is changed according to the treading-in state of an accelerator pedal. For example, when it changes from the state where the leg was laid in the accelerator pedal to the state where the leg was detached, it can judge that there is for example, slowdown volition by the change, and control (for example, control which forbids acceleration) corresponding to it can be performed. Therefore, control with a sufficient precision which met an operator's volition more can be performed.
[0020] In addition, as a treading-in state of an accelerator pedal, the treading strength of the accelerator pedal detected, for example by the treading strength sensor and the amount of treading in of the accelerator pedal detected for example, by the stroke sensor (pedal travel) are employable.
(6) Invention of a claim 6 makes the automatic run control unit of a publication a summary at the aforementioned claim 5 characterized by changing into the control mode which decreases the aforementioned vehicle speed, when the value which shows treading in to the aforementioned accelerator pedal with which the aforementioned control mode change means was detected by the aforementioned treading-in state detection means becomes near the zero.
[0021] The change state of the control mode is illustrated in this invention. Here, when the value (treading strength or pedal travel) which shows treading in to an accelerator pedal becomes near the zero, it judges that there is slowdown volition and changes into the control mode which decreases the vehicle speed.
(7) Invention of a claim 7 makes the automatic run control unit of a publication a summary at the aforementioned claim 5 characterized by changing into the control mode which maintains the aforementioned vehicle speed, when the value which shows treading in to the aforementioned accelerator pedal with which the aforementioned control mode change means was detected by the aforementioned treading-in state detection means becomes near the zero.
[0022] The change state of the control mode is illustrated in this invention. Here, when the value (treading strength or pedal travel) which shows treading in to an accelerator pedal becomes near the zero, it judges that there is slowdown volition and changes into the control mode which maintains the vehicle speed (it does not accelerate at least).
[0023] (8) Invention of a claim 8 makes the automatic run control unit of a publication a summary at the aforementioned claim 5 characterized by changing into the control mode which stops the aforementioned automatic run, when the value which shows treading in to the aforementioned accelerator pedal with which the aforementioned control mode change means was detected by the aforementioned treading-in state detection means becomes near the zero.
[0024] The change state of the control mode is illustrated in this invention. Here, when the value (treading strength or pedal travel) which shows treading in to an accelerator pedal becomes near the zero, it judges that there is slowdown will and changes into the control mode which stops an automatic (as [include / acceleration / at least]) run.

[0025] (9) Invention of a claim 9 makes the automatic run control unit of a publication a summary at either of the aforementioned claims 1-8 characterized by having a selection means by which crew can choose whether the aforementioned accelerator pedal reaction force adjustment means is operated.
[0026] In this invention, crew can choose whether an accelerator pedal reaction force adjustment means is operated. Therefore, the feeling of desired pedal operation can be chosen and it can realize.
(10) Invention of a claim 10 is automatic without operation by the crew of vehicles, and carries out the automatic run control unit carry out having had the automatic run setting means which enables the aforementioned automatic run in the automatic run control unit which performs automatic run control it can run, and the brake-pedal reaction-force adjustment means to which the reaction force of a brake pedal makes increase when the automatic run is performed with the aforementioned automatic run setting means as the feature as a summary.
[0027] In the case of an automatic run, the brake-pedal reaction force adjustment means in this invention is the point which gives reaction force to a pedal, and is fundamentally [as the aforementioned accelerator reaction force adjustment means] the same. Therefore, during an automatic run, when it considers only as the state where the leg was put on the brake pedal, a brake pedal can be held with reaction force, and it can maintain so that it may not be in a braking state. That is, pedal operation can be ensured [promptly and], when braking operation and acceleration operation are needed by a certain cause during an automatic run, since the leg was put on the brake pedal.
[0028] Braking operation can be started if a leg is moved to the next accelerator pedal and it only specifically breaks in, acceleration operation can be started, and the leg on a brake pedal is broken in as it is on the other hand when it is a slowdown.
(11) Invention of a claim 11 makes the automatic run control unit of a publication a summary at the aforementioned claim 10 characterized by setting up the aforementioned brake-pedal reaction force adjustment means so that reaction force can be given to this brake pedal in the predetermined treading-in maintenance position of the aforementioned brake pedal in the case of the aforementioned automatic run.
[0029] this invention has illustrated operation of the brake-pedal reaction force adjustment means in the case of an automatic run. Here, the brake-pedal stopper of for example, a brake-pedal reaction force regulator projects in a brake-pedal side in the case of an automatic run. Therefore, when a leg is only laid in a brake pedal and a brake pedal moves to a predetermined treading-in maintenance position, a brake pedal will be in the state where it does not get into a brake pedal any more for example, from a brake-pedal stopper in response to reaction force.
[0030] (12) Invention of a claim 12 makes a summary the aforementioned claim 10 characterized by for the aforementioned brake pedal stepping on, increasing and setting up reaction force possible so that the aforementioned brake-pedal reaction force adjustment means can be slowed down by crew's volition from the treading-in maintenance position of the aforementioned brake pedal in the case of the aforementioned automatic run, or an automatic run control unit given in 11.
[0031] this invention has illustrated operation of the brake-pedal reaction force adjustment means in the case of an automatic run. Here, in the case of an automatic run, reaction force is set up so that it may be possible to get into a brake pedal further from the state where the leg was only laid. Therefore, braking can be started if a brake pedal is broken in and died as it is to slow down.
[0032] (13) Invention of a claim 13 makes a summary the aforementioned claim 11 characterized by setting up the treading-in maintenance position of the aforementioned brake pedal in the range in which the reaction force for supporting a load when the aforementioned crew's leg is placed is obtained, and a master cylinder pressure carries out a specified quantity boost, and which vehicles do not slow down, or an automatic run control unit given in 12.
[0033] this invention illustrates the treading-in maintenance position of a brake pedal. In this invention, since the treading-in maintenance position of a brake pedal is set up in the range by which the reaction force for supporting a load when crew's leg is placed is obtained, and braking

operation is not started, braking operation is not started only by laying a leg in a brake pedal.
[0034] (14) Invention of a claim 14 makes a summary the aforementioned claim 11 characterized by setting up the treading-in maintenance position of the aforementioned brake pedal in the range which the reaction force for supporting a load when the aforementioned crew's leg is placed is obtained, and a brake lamp does not turn on, or an automatic run control unit given in 12.
[0035] this invention illustrates the treading-in maintenance position of a brake pedal. In this invention, since the treading-in maintenance position of a brake pedal is set up in the range which the reaction force for supporting a load when crew's leg is placed is obtained, and a brake lamp does not turn on, a brake lamp is not turned on only by laying a leg in a brake pedal.
[0036] (15) Invention of a claim 15 makes the automatic run control unit of a publication a summary at either of the aforementioned claims 10-14 characterized by to have a treading-in state detection means to detect the treading-in state of the aforementioned brake pedal, and a control mode change means to change the control mode of the aforementioned automatic run control according to the treading-in state detected by the aforementioned treading-in state detection means.
[0037] In this invention, the control mode of automatic run control is changed according to the treading-in state of a brake pedal. For example, when it changes from the state where the leg was laid in the brake pedal to the state where the leg was detached, it can judge that there is for example, acceleration volition by the change, and control (for example, control which forbids a slowdown) corresponding to it can be performed. Therefore, control with a sufficient precision which met an operator's volition more can be performed.
[0038] In addition, as a treading-in state of a brake pedal, the treading strength of the brake pedal detected, for example by the treading strength sensor and the amount of treading in of the brake pedal detected for example, by the stroke sensor (pedal travel) are employable.
(16) Invention of a claim 16 makes the automatic run control unit of a publication a summary at the aforementioned claim 15 characterized by changing into the control mode which forbids reduction of the aforementioned vehicle speed, when the value which shows treading in to the aforementioned brake pedal which detected the aforementioned control mode change means by the aforementioned treading-in state detection means becomes near the zero.
[0039] The change state of the control mode is illustrated in this invention. Here, when the value (treading strength or pedal travel) which shows treading in to a brake pedal becomes near the zero, it judges that there is acceleration will and the vehicle speed is changed into the control mode which forbids reduction.
(17) Invention of a claim 17 should let the automatic run control unit of a publication a summary at the aforementioned claim 15 characterized by changing the aforementioned control mode change means into the control mode which maintains the aforementioned vehicle speed when the value which shows treading in to the aforementioned brake pedal detected by the aforementioned treading-in state detection means becomes near the zero, and let **** be a summary.
[0040] The change state of the control mode is illustrated in this invention. Here, when the value (treading strength or pedal travel) which shows treading in to a brake pedal becomes near the zero, it judges that there is acceleration will and changes into the control mode which maintains the vehicle speed (it does not slow down at least).
[0041] (18) Invention of a claim 18 makes the automatic run control unit of a publication a summary at the aforementioned claim 15 characterized by changing into the control mode which stops the aforementioned automatic run, when the value which shows treading in to the aforementioned brake pedal which detected the aforementioned control mode change means by the aforementioned treading-in state detection means becomes near the zero.
[0042] The change state of the control mode is illustrated in this invention. Here, when the value (treading strength or pedal travel) which shows treading in to a brake pedal becomes near the zero, it judges that there is acceleration volition and changes into the control mode which stops an automatic (as [include / a slowdown / at least]) run.
[0043] (19) Invention of a claim 19 makes the automatic run control unit of a publication a

summary at either of the aforementioned claims 10-18 characterized by having a selection means by which crew can choose whether the aforementioned brake-pedal reaction force adjustment means is operated.
[0044] In this invention, crew can choose whether a brake-pedal reaction force adjustment means is operated. Therefore, the feeling of desired pedal operation can be chosen and it can realize.
(20) Invention of a claim 20 makes the automatic run control unit of a publication a summary at either of the aforementioned claims 1-19 characterized by adjusting an acceleration means and/or a slowdown means, in order that the aforementioned vehicles run control unit may control this physical relationship to desired value based on the physical relationship of self-vehicles and precedence vehicles.
[0045] this invention illustrates automatic run control of a vehicles run control unit. Here, in order to control this physical relationship to desired value based on the physical relationship of self-vehicles and precedence vehicles, the control which adjusts an acceleration means and/or a slowdown means, and the so-called distance-between-two-cars control (cruise control between vehicles) are shown.
[0046] In addition, as an acceleration means, the throttle actuator which adjusts throttle opening, for example (in direction to open) is mentioned. Moreover, the mechanism in which turn ON a vacuum booster and brake oil pressure is raised as a slowdown means, For example, the mechanism in which wheel-cylinder ** is raised by the solenoid valve of the hydraulic pump used for traction control, brake assistant control, etc., and a hydraulic circuit, The overdrive cut mechanism in which it prohibits transmission from becoming the shift of an overdrive, The down-shift mechanism which carries out a down shift to transmission from a high-order shift, The fuel cut mechanism which prevents that fuel is supplied to an internal combustion engine, the ignition angle-of-delay mechanism in which ignition timing of an internal combustion engine is delayed, The means using 1 of the lock-up mechanism which changes a torque converter into a lock-up state, the exhaust air brake mechanism to which the flow resistance of exhaust air is made to increase, and retarder styles, or two or more is mentioned.
[0047] (21) Invention of a claim 21 makes the automatic run control unit of a publication a summary at either of the aforementioned claims 1-19 characterized by adjusting an acceleration means and/or a slowdown means, in order that the aforementioned vehicles traveller may control the speed of self-vehicles to the set-up desired value.
[0048] this invention illustrates automatic run control of a vehicles run control unit. Here, in order to control the speed of self-vehicles to the set-up desired value, the control which adjusts an acceleration means and/or a slowdown means, and the so-called fixed-speed run control (fixed-speed cruise control) are shown.
[0049] In addition, about an acceleration means and a slowdown means, it is the same as that of the aforementioned claim 20.
(22) Invention of a claim 22 makes the automatic run control unit of a publication a summary at either of the aforementioned claims 1-21 characterized by the vehicles which perform the aforementioned automatic run control being vehicles which have the mechanism in which operation of an accelerator pedal is mechanically transmitted to a throttle.
[0050] this invention has illustrated the mechanism in which a throttle is driven. Here, the mechanism in which operation of an accelerator pedal was made to link to a throttle in mechanism is shown. That is, a reaction force regulation means to adjust the reaction force of each pedal is applicable to the vehicles equipped with the mechanism-throttle.
[0051] (23) Invention of a claim 23 makes the automatic run control unit of a publication a summary at either of the aforementioned claims 1-21 characterized by being the vehicles with which the vehicles which perform the aforementioned automatic run control were equipped with the electronic throttle which drives a throttle with the electric signal corresponding to operation of an accelerator pedal.
[0052] this invention has illustrated the mechanism in which a throttle is driven. Here, operation of an accelerator pedal is taken out as an electric signal, and the mechanism of the so-called electronic throttle in which a throttle is driven based on this signal is shown. That is, a reaction

force regulation means to adjust the reaction force of each pedal is applicable also to the vehicles equipped with the electronic throttle.

[0053] (24) In the automatic run control unit with which invention of a claim 24 performs automatic run control to the vehicles equipped with the electronic throttle which drives a throttle with the electric signal corresponding to operation of an accelerator pedal Let the automatic run control unit characterized by having a change means to change the operating state of the electronic throttle corresponding to the stroke of an accelerator pedal, according to the case of execution of the automatic run by the automatic run setting means which enables an automatic run, and the aforementioned automatic run setting means, and a stop be a summary.

[0054] In the case of an electronic throttle, this invention is not equipped with an accelerator pedal reaction force adjustment means. That is, when not using an accelerator pedal reaction force adjustment means, according to the case of execution of an automatic run, and a stop, by changing the operating state of the electronic throttle corresponding to the stroke of an accelerator pedal, it can consider as the state where the leg was only laid in the accelerator pedal, like invention of the aforementioned claim 1, and the quick nature and certainty of pedal operation can be realized.

[0055] That is, if a leg is laid in an accelerator pedal, although it will be in the state where it got into the accelerator pedal slightly by that cause, in the case of an automatic run, acceleration operation is not performed by considering that few of this treading-in state is a treading-in (it does not accelerate and he is excused from leg) maintenance state. On the other hand, in the usual run, even if it is treading in to few accelerator pedals (however, the play of the usual pedal is removed), acceleration operation according to the amount of treading in is performed.

[0056] (25) In execution of the aforementioned automatic run, invention of a claim 25 makes the automatic run control unit of a publication a summary at the aforementioned claim 24 characterized by controlling the operating state of the aforementioned electronic throttle in the suppression direction of open operation compared with the case of a stop of the aforementioned automatic run.

[0057] this invention illustrates invention of the aforementioned claim 24. Here, in execution of an automatic run, the operating state of an electronic throttle is controlled in the suppression direction of open operation compared with the case of a stop of an automatic run. Therefore, acceleration operation is not performed only by a leg being laid in an accelerator pedal, but it gets into an accelerator pedal further, begins, and acceleration operation is started.

[0058] (26) The aforementioned claims 1-23 are the pedal reaction force regulators used for the automatic run control unit of a publication either, and project invention of a claim 26 from the treading-in direction and opposite direction of a pedal to a pedal side in the case of the aforementioned automatic run, and it makes a summary the pedal reaction force regulator characterized by having the mechanism which gives reaction force to a pedal in contact with the time of treading in to a pedal.

[0059] this invention illustrates a pedal reaction force regulator. This composition can give reaction force to an accelerator pedal or a brake pedal in the case of an automatic run.

(27) invention of a claim 27 -- either of the aforementioned claims 1-25 -- let the record medium characterized by recording the means for realizing the function of the automatic run control unit of a publication be a summary

[0060] this invention shows the record medium which recorded the means (for example, program) for realizing the function of an automatic run control unit. That is, it can have the function to realize an automatic run control unit which was mentioned above in a computer system, as a program started for example, by the computer system side. It can record on the record medium which can computer read the case of such a program, for example, a floppy disk, a magneto-optic disk, CD-ROM, a hard disk, etc., and can use by loading to a computer system and starting if needed. In addition, the aforementioned program is recorded by using ROM and backup RAM as the record medium in which computer reading is possible, and this ROM or Backup RAM may be incorporated and used for a computer system.

[0061]

[Embodiments of the Invention] Next, the example (example) of the form of operation of the

automatic run control unit of this invention, a pedal reaction force regulator, and a record medium is explained based on a drawing.
(Example 1)
a) Explain the hard composition of the automatic run control unit of an example 1, and its peripheral device first.
[0062] The automatic run control unit of this example 1 can perform control between vehicles (cruise control between vehicles) as automatic run control. Moreover, the vehicles with which this automatic run control unit is carried are equipped with the so-called electronic throttle which replaces operation of an accelerator pedal with an electric signal, and drives a throttle.
[0063] Drawing 1 is a block diagram showing the outline composition of the various control circuits carried in the automobile shown centering on the control unit 2 ("the control ECU between vehicles" is called hereafter.) between vehicles, the laser radar sensor 3, the brake electronic control 4 ("Brake ECU" is called hereafter.), and the engine electronic control 6 ("Engine ECU" is called hereafter.).
[0064] As shown in drawing 1 , the control ECU 2 between vehicles is an electronic circuitry constituted considering the microcomputer as a center, and receives the present vehicle speed (Vn) signal, a steering angle signal, a yaw rate signal, the time signal between target vehicles, windshield-wiper-switch information, the control state signal of idle control or brake control, etc. from the engine electronic control 6. And the control ECU 2 between vehicles performs a vehicles control operation etc. based on this received data.
[0065] The laser radar sensor 3 is an electronic circuitry constituted considering the scanning ranging machine and microcomputer by laser as a center. The present vehicle speed (Vn) signal received from the control ECU 2 between vehicles, such as an angle, relative velocity, etc. of a precedence vehicle which were detected with the scanning ranging vessel Based on the curve radius of curvature R etc., the self-lane probability of a precedence vehicle is calculated as a function of a part of control between vehicles, and it transmits to the control ECU 2 between vehicles as precedence vehicle information also including information, such as relative velocity. Moreover, the DAIAGU no cis-signal of laser radar sensor 3 self is also transmitted to the control ECU 2 between vehicles.
[0066] Furthermore, the aforementioned control ECU 2 between vehicles determines the precedence vehicle which should be controlled between vehicles based on the self-lane probability included in the precedence vehicle information received from the laser radar sensor 3 in this way, and is a distance-between-two-cars considerable amount (specifically, it is the time between vehicles.) with a precedence vehicle. The distance between two cars itself is sufficient. A target acceleration signal, a fuel cut demand signal, OD cut demand signal, the 3rd speed down-shift demand signal, the alarm demand signal, the DAIAGU no cis-signal, the indicative-data signal, etc. are transmitted to the engine ECU 6 that it should adjust appropriately.
[0067] A brake ECU 4 is an electronic circuitry constituted considering the microcomputer as a center, from the steering sensor 8 which detects the steering angle of vehicles, and the yaw rate sensor 10 which detects a yaw rate, asked for the steering angle or the yaw rate, and has transmitted these data to the control ECU 2 between vehicles through an engine ECU 6.
[0068] Moreover, a brake ECU 4 carries out singing of the alarm buzzer 14 according to the alarm demand signal from the control ECU 2 between vehicles through an engine ECU 6, drives the brake actuator 25 further according to the brake demand signal from the control ECU 2 between vehicles through an engine ECU 6, and the target acceleration signal from an engine ECU 6, and adjusts a brake force.
[0069] In addition, as a brake actuator 25, the vacuum booster of the common knowledge which can boost wheel-cylinder **, and the composition of the hydraulic pump, boost control valve, and reduced pressure control valve of a brake hydraulic circuit are mentioned. An engine ECU 6 is an electronic circuitry constituted considering the microcomputer as a center. Throttle opening The throttle opening sensor 15 and vehicles speed to detect The vehicle speed sensor 16 and the treading-in existence of a brake to detect The brake switch 18 to detect, the cruise main switch 20 which sets up turning on and off of the control between vehicles mentioned later, the cruise-control switch 22 which sets up the distance between two cars, the accelerator pedal

treading strength sensor 23 which detects the treading strength of an accelerator pedal 31, the amount of treading in of an accelerator pedal The accelerator position sensor 27 which detects the accelerator opening corresponding to the (pedal travel) and the detecting signal from another sensor and other switches, or the windshield-wiper-switch information and tail switch information received through the body LAN 28 is received.

[0070] Furthermore, the engine ECU 6 has received the steering angle signal from a brake ECU 4, a yaw rate signal or the target acceleration signal from the control ECU 2 between vehicles, a fuel cut demand signal, OD cut demand signal, a 3rd speed down-shift demand signal, the alarm demand signal, the brake demand signal, the DAIAGU no cis-signal, the indicative-data signal, etc.

[0071] And the engine ECU 6 is outputting the drive instruction to the accelerator pedal reaction force regulator 30 which adjusts the reaction force of the throttle actuator 24 which adjusts the throttle opening of an internal combustion engine (here gasoline engine), the transmission actuator 26 which adjusts gear change of transmission (not shown), and the accelerator pedal 31 mentioned later according to the operational status judged from this received signal. And it is possible to control the output of an internal combustion engine, a brake force, or a gear change shift by these actuators.

[0072] Moreover, an engine ECU 6 transmits and displays required display information on display (not shown), such as LCD with which the dashboard is equipped, through the body LAN 28, or has transmitted the present vehicle speed (Vn) signal, a steering angle signal, the yaw rate signal, the time signal between target vehicles, the windshield-wiper-switch information signal, and the control state signal of idle control or brake control to the control ECU 2 between vehicles.

[0073] b) Next, explain the vehicles control processing performed between the control ECU 2 between vehicles and the laser radar sensor 3 of composition of having mentioned above, a brake ECU 4, and an engine ECU 6 based on the flow chart of drawing 2 . The control between this vehicle is the so-called cruise control between vehicles, and is control for maintaining the target distance between two cars and following a precedence vehicle.

[0074] First, it judges whether the cruise main switch 20 is ON with an engine ECU 6 (S100). And accelerator pedal reaction force adjustment processing which controls operation of the accelerator pedal reaction force regulator 30 when the cruise main switch 20 is ON is performed (S105), and on the other hand, when it is not ON, this processing is once ended. In addition, the accelerator pedal reaction force regulator 30 and accelerator pedal reaction force adjustment processing are explained in full detail behind.

[0075] Next, the established state in the target distance-between-two-cars configuration switch (not shown) prepared in the cruise-control switch 22 is read, and the time Td between target vehicles is set up (S110). This target distance-between-two-cars configuration switch is set up by the operator.

[0076] Next, a precedence vehicle is determined based on the presumed curve radius of curvature R given from the control ECU 2 between vehicles by the laser radar sensor 3, and the distance between two cars D with the precedence vehicle is measured (S120). Furthermore, measurement of the relative velocity Vrel with a precedence vehicle is made by the laser radar sensor 3 (S130).

[0077] Next, based on the pulse signal of the vehicle speed sensor 16, calculation of the present vehicle speed (self-vehicle speed) Vn of a self-vehicle is made with an engine ECU 6 (S140). Next, the time Tn (sec) between measurement vehicles is computed like the following formula [1] from the distance between two cars D and the present vehicle speed Vn which were measured at Step S120 and Step S140 by the control ECU 2 between vehicles (S145).

[0078]

Tn <- D(n) x3.6/Vn -- [1]

Here, n in D (n) expresses that D (n) is the present distance between two cars D. Next, calculation of the target acceleration ATmc is made by the control ECU 2 between vehicles (S150). This calculation asks for the time deflection Tde between vehicles like the following formula [2] first from the time Td between target vehicles found at Step S110, and the time Tn between measurement vehicles found at Step S145. This time deflection Tde between vehicles,

It is carried out by asking for the target acceleration ATmc from the target acceleration ATmc operation map which shows the relative velocity Vrel called for at Step S130 to drawing 3 based on Vr_filter (n) annealed, processed and obtained.
[0079]
Tde (n) <- Tn (n) - Td -- [2]
It seems that n was mentioned above. Next, the real acceleration ATj of a self-vehicle is computed from time change of the present vehicle speed Vn called for at Step S140 by the control ECU 2 between vehicles (S160).
[0080] Next, an acceleration error ATdelt is called for like the following formula [3] from the target acceleration ATmc called for at Step S150 by the control ECU 2 between vehicles, and the real acceleration ATj called for at Step S160 (S170).
ATdelt <- ATmc - ATj -- [3]
And with an engine ECU 6, the target throttle opening MA calculates like the following formula [4] based on this acceleration error ATdelt (S175).
[0081]
MA (n) <- MA (n-1) + GxATdelt -- [4]
Here, as n was mentioned above, MA (n-1) expresses the target throttle opening MA called for last time, and G expresses a coefficient (gain). With an engine ECU 6, based on this target throttle opening MA, the throttle actuator 24 drives and the output of a gasoline engine is adjusted.
[0082] Next, although it is processing for the slowdown to which each processing of the slowdown processing (S180) by the fuel cut performed, the slowdown processing (S190) by OD (overdrive) cut, and the slowdown processing (S195) by the down shift is performed by the control ECU 2 between vehicles, it is the same processing, and since it is not the important section of this processing, the explanation omits as it is indicated by the Japanese-Patent-Application-No. No. 195918 [nine to] specification, for example.
[0083] c) Next, explain the aforementioned accelerator pedal reaction force regulator 30.
** Explain the structure of the accelerator pedal reaction force regulator 30 first based on drawing 4 . As shown in drawing 4 , the soffit of an accelerator pedal 31 is attached in the dummy support 32 of a floor possible [rotation], and the upper limit is attached in the extended metallic ornaments 32 so that tilting of an accelerator pedal 31 may be possible. The extended metallic ornaments 32 are attached in the dummy support 33 of a wall surface possible [rotation], the upper limit of the extended metallic ornaments 32 is connected to the accelerator wire 34, and the accelerator wire 34 is connected to the shank 36 in which the accelerator position sensor 27 was attached.
[0084] The accelerator pedal reaction force regulator 30 is attached in the wall surface which inclines and goes up from a floor, and is arranged in the position which countered the press section 37 prepared in the soffit side of the extended metallic ornaments 32. This accelerator pedal reaction force regulator 30 consists of a DC motor (not shown), worm gearing 41, a worm wheel 42, a ball screw 43, and a reaction force controller 44.
[0085] Among these, the ball screw 43 is arranged at the shaft center of a worm wheel 42, and with rotation of a worm wheel 42, although movement to shaft orientations is possible, the rotation is regulated. Moreover, the reaction force controller 44 is formed at the nose of cam of the ball screw 43, and the convex accelerator pedal stopper 47 is arranged and it is constituted by the tube-like object 46 as air DAMBA.
[0086] Therefore, if the accelerator pedal stopper 47 is pressed by the press section 37 when the accelerator pedal reaction force regulator 30 is turned on and the reaction force controller 44 projects to an accelerator pedal 31 side, predetermined reaction force can be generated to an accelerator pedal 31 by air DAMBA.
[0087] ** Next, explain fundamental operation of the accelerator pedal reaction force regulator 30 based on drawing 5 .
- For example, when it is not automatic run control, as shown in drawing 5 (a), the accelerator pedal reaction force regulator 30 is set to the state of OFF. That is, a DC motor rotates normally, a worm wheel 42 rotates by rotation of worm gearing 41, and the ball screw 43 and the

reaction force controller 44 are drawn in a wall surface side.
[0088] Since the interval of the accelerator pedal stopper 47 and the press section 37 spreads, the amount of displacement of the accelerator pedal 31 required for the usual accelerator operation is secured by this operation.
- On the other hand, as shown at drawing 5 (b) in automatic run control, the accelerator pedal reaction force regulator 30 is set to the state of ON. That is, a DC motor is reversed, a worm wheel 42 rotates by rotation of worm gearing 41, and the ball screw 43 and the reaction force controller 44 project outside (accelerator pedal 31 side).
[0089] When a leg is only put on an accelerator pedal 31 by this operation therefore, in the state where the accelerator pedal 31 was broken in slightly, the press section 37 contacts the accelerator pedal stopper 47. That is, although an accelerator pedal 31 displaces slightly with the self-weight of a right leg, an accelerator pedal 31 is held with the accelerator pedal stopper 47 with the reaction force of an air damper (held in a treading-in maintenance position).
[0090] - When an accelerator pedal 31 is stepped on again with the strong treading strength to which the accelerator pedal reaction force regulator 30 excels the reaction force of an air damper in the state of ON, as shown in drawing 5 (c), the accelerator pedal stopper 47 is pushed in and acceleration operation is started.
- And it follows rotation of the accelerator position sensor 27, and a throttle opens [since the amount of displacement of an accelerator pedal 31 (amount of treading in; pedal travel) is measured by the accelerator position sensor 27 through the accelerator wire 3 connected] and closes electrically.
[0091] - Get it blocked, and in the state of ON, to the amount of very small rotation of the accelerator position sensor 27 (therefore, very small stroke), the accelerator pedal reaction force regulator 30 has prepared the neutral zone (slash portion of drawing 6) electrically, and does not open a throttle. And when it gets into an accelerator pedal 31 further, it is set up so that a throttle may open according to it.
[0092] Although drawing 6 shows this state, when a brake pedal 31 is broken in and died, at the time of an automatic run, the reaction force of an air damper shows that control force by foot rises greatly between neutral zones.
- Although an accelerator pedal 31 returns slightly again in the state of ON of the accelerator pedal reaction force regulator 30 when a leg is separated from an accelerator pedal 31, the state where the leg was separated from the accelerator pedal 31 is detectable by detecting this change by the accelerator position sensor 27.
[0093] d) Next, explain accelerator pedal reaction force adjustment processing of the above S105 based on drawing 7 . This processing is processing performed when the cruise switch 20 for starting the cruise control between vehicles with the above S100 is turned on on.
[0094] It judges whether in S200 of drawing 7 , in case the cruise-control switch 22 carries out that it is the state of ON, i.e., the cruise control between vehicles, the distance between two cars is set up. If affirmative judgment is carried out here, it will progress to S210, and this processing is once ended, without performing cruise control between vehicles, if negative judgment is carried out on the other hand.
[0095] In S210, since cruise control between vehicles is performed, the accelerator pedal reaction force regulator 30 is turned ON. Specifically, a DC motor is reversed, a worm wheel 42 is rotated by rotation of worm gearing 41, and the ball screw 43 and the reaction force controller 44 are made to project outside (accelerator pedal 31 side).
[0096] In S220 continuing, the accelerator opening SA which shows a pedal travel judges whether it exceeds the 1st reference value SA 1 of the big value shown in drawing 6 based on the signal of the accelerator position sensor 27. If affirmative judgment is carried out here, it will progress to S230, and if negative judgment is carried out on the other hand, it will progress to S240.
[0097] In S230, it judges that an accelerator pedal 31 is in a state with the acceleration volition into which it got further from the state where the leg was only laid in the accelerator pedal 31 (override judging), and control based on an override judging is performed. For example, in order to forbid slowdown control of closing a throttle, a slowdown control flag is set to 0 and this

processing is once ended.
[0098] On the other hand, in S240, the accelerator opening SA judges whether it is less than the 2nd reference value SA 2 (<SA1) of the small value shown in drawing 6 . In order to progress to S250 if affirmative judgment is carried out here, to judge that it is in the state where the leg was only laid in the accelerator pedal 31 if negative judgment is carried out on the other hand and to continue the cruise control between vehicles, this processing is once ended.
[0099] In S250, it is judged as the state where the leg was separated from the accelerator pedal 31 (slowdown volition judging), and control based on a slowdown volition judging is performed. For example, slowdown control which decelerates vehicles, vehicle speed maintenance control which maintains the vehicle speed, or automatic run stop control which stops an automatic run of vehicles is performed, and this processing is once ended.
[0100] Thus, in this example, since it turns on the accelerator pedal regulator 30 in performing cruise control between vehicles, it can maintain at the state where the leg was only put on the accelerator pedal 31, with the reaction force, without performing acceleration operation. Therefore, like the former, where a leg is put on a floor, compared with the case where the cruise between vehicles is performed, next accelerator operation and next brake operation can be ensured [promptly and].
[0101] Furthermore, while a leg can be put on an accelerator pedal 31 and being able to perform the cruise between vehicles without sense of incongruity except the aspect of affairs which needs brakes operation like the time of the usual (not accompanied by automatic run) operation by forming the accelerator pedal reaction force regulator 30 in an accelerator pedal 31, also in the aspect of affairs which needs brakes operation, brakes operation can be performed smoothly.

[0102] Moreover, in this example, by the accelerator position sensor 27, since it turns out into how many accelerator pedals 31 it got, according to the treading-in state, the control mode can be switched to the control in an override judging, or the control in a slowdown volition judging. Acceleration, a slowdown, etc. can be ensured [thereby more promptly and].
[0103] In addition, in this example, when the cruise main switch 20 or the cruise-control switch 22 is turned off off, the accelerator pedal reaction force regulator 30 is also set to OFF. moreover -- although the so-called link loess throttle (electronic throttle) which makes operation of an accelerator pedal 31 link from mechanical structure, and it does not transmit [throttle] to a throttle, but operates a throttle using an electrical signal was mentioned as the example in this example -- the above -- you may apply control of this example to the vehicles which have the composition which transmits operation to a throttle by mechanical composition (Example 2) Next, although an example 2 is explained, explanation of the same part as the aforementioned example is omitted or simplified.
[0104] Like the aforementioned example 1, the automatic run control unit of this example does not change the control mode based on the signal of an accelerator position sensor, but changes the control mode based on the signal of an accelerator treading strength sensor. As this accelerator treading strength sensor, the load sensor attached, for example at the nose of cam of the accelerator pedal stopper 47 is employable.
[0105] Next, the accelerator pedal reaction force adjustment processing which is the important section of this example is explained based on the flow chart of drawing 8 . In S300 of drawing 8 , the cruise-control switch 22 judges whether it is the state of ON. If affirmative judgment is carried out here, it will progress to S310, and this processing is once ended, without performing cruise control between vehicles, if negative judgment is carried out on the other hand.
[0106] In S310, since cruise control between vehicles is performed, the accelerator pedal reaction force regulator 30 is turned ON. In S320 continuing, control-force-by-foot Faccel judges whether it exceeds the 1st criteria treading strength Fref1 of the big value shown in aforementioned drawing 6 based on the signal of the accelerator pedal treading strength sensor 23. If affirmative judgment is carried out here, it will progress to S330, and if negative judgment is carried out on the other hand, it will progress to S340.
[0107] In S330, in order to judge that an accelerator pedal 31 is in a state with the acceleration volition into which it got further from the state where the leg was only laid in the accelerator

pedal 31 (override judging) and to forbid slowdown control, a slowdown control flag is set to 0 and this processing is once ended.
[0108] On the other hand, in S340, control-force-by-foot Faccel judges whether it is less than the 2nd criteria treading strength Fref2 (<Fref1) of the small value shown in aforementioned drawing 6 . In order to progress to S350 if affirmative judgment is carried out here, to judge that it is in the state where the accelerator pedal 31 was only laid in the accelerator pedal 31 if negative judgment is carried out on the other hand, and to continue the cruise control between vehicles, this processing is once ended.
[0109] In S350, it is judged as the state where the leg was separated from the accelerator pedal 31 (slowdown volition judging), and control based on a slowdown volition judging is performed. For example, slowdown control which decelerates vehicles, vehicle speed maintenance control which maintains the vehicle speed, or automatic run stop control which stops an automatic run of vehicles is performed, and this processing is once ended.
[0110] In this example, since it is the same as that of the aforementioned example 1 except replacing with the signal of the accelerator position sensor 27, and using the signal of the accelerator pedal treading strength sensor 23, when performing cruise control between vehicles, a leg can be laid in an accelerator pedal 31 and, therefore, the remarkable effect promptly and that next accelerator operation and next brake operation can be ensured is done so like the aforementioned example 1.
(Example 3) Next, although an example 3 is explained, explanation of the same part as the aforementioned example is omitted or simplified.
[0111] The automatic run control unit of this example is [only turning on and off an accelerator pedal reaction force regulator and], without simplifying the aforementioned examples 1 and 2 further and changing especially the control mode. Next, the accelerator pedal reaction force adjustment processing which is the important section of this example is explained based on the flow chart of drawing 9 .
[0112] In S400 of drawing 9 , the cruise-control switch 22 judges whether it is the state of ON. If affirmative judgment is carried out here, it will progress to S410, and this processing is once ended, without performing cruise control between vehicles, if negative judgment is carried out on the other hand. In S410, since cruise control between vehicles is performed, the accelerator pedal reaction force regulator 30 is turned ON, and this processing is once ended.
[0113] Since it turns on the accelerator pedal reaction force regulator 30 when this example also performs cruise control between vehicles, the remarkable effect promptly and that accelerator operation and brake operation can be ensured is done so.
(Example 4) Next, although an example 4 is explained, explanation of the same part as the aforementioned example is omitted or simplified.
[0114] Especially the automatic run control unit of this example is used for the vehicles equipped with the electronic throttle, and the same effect as the aforementioned examples 1-3 is acquired here without using an accelerator pedal reaction force regulator.
a) first -- fundamental **** of this example -- ****** just
[0115] As shown in drawing 10 (a), since the accelerator pedal reaction force regulator is not arranged, by this example, operation of an accelerator pedal 31 is detected by the accelerator position sensor 27 as a pedal travel as it is through the accelerator wire 34.
[0116] In this example, as the time of a run and an automatic run is usually shown in drawing 10 (b), the relation between a pedal travel and control force by foot is set up. Moreover, the slash portion of this drawing is a neutral zone, and even if a pedal travel increases, it is set up in this band so that a throttle may not open.
[0117] That is, this neutral zone is only set as the accelerator pedal 31 corresponding to the pedal travel only in the state where the leg was laid. In detail, usually, although a throttle will begin to open at the time of a run if a pedal travel exceeds the 2nd reference value SA 2, after a pedal travel exceeds the 1st reference value SA 1 (>SA2), in the time of an automatic run, it is set up so that a throttle may begin to open.
[0118] Therefore, only by laying a leg in an accelerator pedal 31, a throttle does not open, but the cruise control between vehicles is continued as it is, and it will not be in the usual

acceleration state by treading in to an accelerator pedal 31.
b) Next, explain the control mode change processing which is the important section of this example based on the flow chart of drawing 11 .
[0119] In S500 of drawing 11 , the cruise-control switch 22 judges whether it is the state of ON. If affirmative judgment is carried out here, it will progress to S510, and if negative judgment is carried out on the other hand, this processing will once be ended, without performing cruise control between vehicles. In S510, it judges whether a pedal travel SA exceeds the 1st reference value SA 1 based on the signal of the accelerator position sensor 27. If affirmative judgment is carried out here, it will progress to S520, and if negative judgment is carried out on the other hand, it will progress to S530.
[0120] In S520, in order to judge that an accelerator pedal 31 is in the state which only shows the acceleration will into which it got further from the state where the leg was laid in an accelerator pedal 31 (override judging) and to forbid slowdown control, a slowdown control flag is set to 0 and this processing is once ended.
[0121] On the other hand, in S530, it judges whether a pedal travel SA is less than the 2nd reference value SA 2 (<SA1). In order to progress to S540 if affirmative judgment is carried out here, to judge that it is in the state where the accelerator pedal 31 was only laid in the accelerator pedal 31 if negative judgment is carried out on the other hand, and to continue the cruise control between vehicles, this processing is once ended.
[0122] In S540, it is judged as the state where the leg was separated from the accelerator pedal 31 (slowdown will judging), and control based on a slowdown will judging is performed. For example, slowdown control which decelerates vehicles, vehicle speed maintenance control which maintains the vehicle speed, or automatic run stop control which stops an automatic run of vehicles is performed, and this processing is once ended.
[0123] In this example, like the aforementioned example 1, when performing the cruise between vehicles, a leg can be laid in an accelerator pedal 31 and, therefore, the remarkable effect promptly and that next accelerator operation and next brake operation can be ensured is done so. Moreover, since an accelerator pedal reaction force regulator is not needed, there is an advantage that composition can be simplified.
(Example 5) Next, an example 5 is explained.
[0124] This examples differ in the aforementioned examples 1-4, and adjust the reaction force of a brake pedal at the time of the cruise control between vehicles.
a) The hard composition of this example is the same as that of the case where the accelerator pedal of the aforementioned example 1 is transposed to a brake pedal. That is, since it is only that the kinds of pedal which is an object differ, and the structure and operation are the same as what was shown in aforementioned drawing 4 and drawing 5 and are the same as that of aforementioned drawing 6 also about the property, the aforementioned accelerator pedal reaction force regulator and the brake-pedal reaction force regulator (illustration abbreviation) used by this example omit the detailed explanation.
[0125] Especially, at the neutral zone of a brake-pedal reaction force regulator, only by laying a leg in a brake pedal, it is set up so that it may not increase to a pressure for which a brake requires master cylinder **, and it is set up so that a brake lamp may not be turned on, either.
b) Next, explain brake-pedal reaction force adjustment processing of this example based on the flow chart of drawing 12 .
[0126] This processing can be succeedingly performed for example, to accelerator pedal reaction force adjustment processing. In S600 of drawing 12 , the cruise-control switch 22 judges whether it is the state of ON. If affirmative judgment is carried out here, it will progress to S610, and this processing is once ended, without performing cruise control between vehicles, if negative judgment is carried out on the other hand.
[0127] Since cruise control between vehicles is performed, a brake-pedal reaction force regulator is turned ON, and the reaction force controller which the nose of cam does not illustrate is made to project outside (brake-pedal side) in S610. In S620 continuing, it judges whether a pedal travel SB exceeds the 1st reference value SB1 of a big value based on the signal of the accelerator position sensor 27 and the same brake position sensor. If affirmative

judgment is carried out here, it will progress to S630, and if negative judgment is carried out on the other hand, it will progress to S640.
[0128] In S630, an accelerator pedal 31 and the same brake pedal judge that it is in the state which shows the braking will into which it got further from the state where the leg was only laid in the brake pedal (override judging), perform braking operation based on this override judging, and once end this processing.
[0129] For example, a vacuum booster is turned on, master cylinder ** is raised, and it brakes by raising wheel-cylinder **. Or while operating a hydraulic pump, it brakes by operating the solenoid valve of a hydraulic circuit and making wheel-cylinder ** increase.
[0130] On the other hand, in S640, it judges whether a pedal travel SB is less than the 2nd reference value SB2 (<SB1) of a small value. In order to progress to S650 if affirmative judgment is carried out here, to judge that it is in the state where the leg was only laid in the brake pedal if negative judgment is carried out on the other hand and to continue the cruise control between vehicles, this processing is once ended.
[0131] In S650, it is judged as the state where the leg was separated from the brake pedal 31 (acceleration volition judging), control based on this acceleration volition judging is performed, and this processing is once ended. For example, slowdown prohibition control which forbids a slowdown of vehicles, vehicle speed maintenance control which maintains the vehicle speed, or automatic run stop control which stops an automatic run of vehicles is performed, and this processing is once ended.
[0132] Thus, in this example, since it turns on the brake-pedal regulator in performing cruise control between vehicles, it can maintain at the state where the leg was put on the brake pedal, with the reaction force, without performing braking. Therefore, like the former, where a leg is put on a floor, compared with the case where cruise control between vehicles is performed, next accelerator operation and next brake operation can be ensured [promptly and].
[0133] Moreover, in this example, by the brake position sensor, although it got into how many brake pedals, since it understands, according to the treading-in state, the control mode can be switched to the control in an override judging, or the control in an acceleration will judging. Control of acceleration, a slowdown, etc. can be ensured [thereby much more promptly and].
[0134] In addition, it cannot be overemphasized by this invention that it can carry out in various modes in the range which is not limited to the aforementioned example at all and does not deviate from this invention.
(1) For example, although the accelerator pedal reaction force regulator and the brake-pedal reaction force regulator were automatically turned on in the aforementioned example in the cruise control between vehicles, it is not automatic and you may enable it to choose by the operator whether operation of these pedal reaction force regulators is performed by the manual.
[0135] (2) Moreover, although the aforementioned example described the cruise control between vehicles which maintains the distance between two cars at a predetermined value, this invention is applicable also to the fixed-speed cruise control which maintains the speed of self-vehicles at a predetermined value.
(3) Furthermore, although both an accelerator pedal reaction force regulator and a brake-pedal reaction force regulator may be carried in vehicles, either is sufficient.
[0136] (4) Moreover, in the aforementioned example, although the automatic run control unit was described, this invention is applicable not only to them but the record medium which has memorized a means to perform processing mentioned above. As this record medium, various kinds of record media, such as an electronic control constituted as a microcomputer, a microchip, a floppy disk, a hard disk, and an optical disk, are mentioned. That is, if meanses, such as a program which can perform processing of the automatic run control unit mentioned above, are memorized, there will be especially no limitation.

[Translation done.]